

INTERNATIONAL SEARCH REPORT

International application No

PC./US 2005/038017

<p>A CLASSIFICATION OFF SUBJECT MATTER C08C 19/44 C08C 19/30 C08L 19/00</p>		
<p>According to International Patent Classification (IPC) or to both national classification and IPC</p>		
<p>B FIELDS SEARCHED</p>		
<p>Minimum documentation searched (classification system followed by classification symbols) C08C</p>		
<p>Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched</p>		
<p>Electronic data base consulted during the international search (name of data base and where practical search terms used) EPO-Internal , WPI Data</p>		
<p>C DOCUMENTS CONSIDERED TO BE RELEVANT</p>		
Category*	Citation of document with indication where appropriate of the relevant passages	Relevant to claim No
X	EP 1 449 857 A (BRIDGESTONE CORPORATION) 25 August 2004 (2004-08-25)	1-17, 20
Y	* preparation example 4 * * table 1-4 * abstract; claims	18, 19
X	EP 1 319 673 A (BAYER AG) 18 June 2003 (2003-06-18) abstract, claims page 5, line 29 - line 40	1-17, 20
X	EP 1 457 501 A (JSR CORPORATION) 15 September 2004 (2004-09-15) abstract; claims page 10, line 18 - page 11, line 30	1-3, 7-16
	-/-	
<p><input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C <input checked="" type="checkbox"/> See patent family annex</p>		
<p>* Special categories of cited documents</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents such combination being obvious to a person skilled in the art</p> <p>"&" document member of the same patent family</p>		
<p>Date of the actual completion of the international search 13 February 2006</p>		<p>Date of mailing of the international search report 20/02/2006</p>
<p>Name and mailing address of the ISA/ European Patent Office, P B 5818 Patentlaan 2 NL - 2280 HV RIJSWIJK Tel (+31-70) 340-2040 Tx 31 651 epo nl Fax (+31-70) 340-3016</p>		<p>Authorized officer Mettler, R-M</p>

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Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No
X	EP 0 890 607 A (COMPAGNIE GENERALE DES ETABLISSEMENTS MICHELIN-MICHELIN & CIE) 13 January 1999 (1999-01-13) abstract; claims	1,3,7, 9-16
Y	EP 0 745 614 A (DOW CORNING CORPORATION) 4 December 1996 (1996-12-04) abstract; claims; examples	18,19

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AMENDED CLAIMS
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We claim:

1. A method of making an amine-functionalized polymer, comprising:
 - a) in a reaction medium, reacting a living polymer with a cyclic compound comprising at least one siloxane unit in its ring structure so as to provide an intermediate functionalized living polymer;
 - b) introducing into said reaction medium an amine comprising an active hydrogen atom attached to the amino nitrogen atom of said amine and allowing said amine to chemically bond to said intermediate functionalized living polymer, thereby providing said amine-functionalized polymer.
2. The method of claim 1 wherein said cyclic compound comprises at least three siloxane units in its ring structure.
3. The method of claim 2 wherein said ring structure of said cyclic compound consists of silicon and oxygen atoms.
4. The method of any of claims 2 to 3 wherein at least one of the silicon atoms of said cyclic compound comprises at least one C₁-C₆ substituent.
5. The method of any of claims 2 to 3 wherein each of the silicon atoms of said cyclic compound comprises at least one C₁-C₃ alkyl group.
6. The method of claim 5 wherein said cyclic compound is hexamethylcyclotri-siloxane or octaniethylcyclotetrasiloxane.
7. The method of any of claims 1 to 6 further comprising the step of providing said living polymer via anionic solution polymerization.

8. The method of claim 7 wherein said polymer is a substantially random interpolymer comprising mer units derived from one or more vinyl aromatics and one or more polyenes.
9. A functionalized polymer comprising an elastomer, a terminal functional group comprising at least two different heteroatoms and, intermediate said elastomer and said functional group, at least three siloxane units.
10. The functionalized polymer of claim 9 wherein each silicon atom in each of said siloxane units is substituted with C1-C3 alkyl groups.
11. The functionalized polymer of any of claims 9 to 10 wherein said functional group comprises a primary or secondary amino group.
12. The functionalized polymer of any of claims 9 to 11 wherein said functional group comprises siloxane functionality.
13. The functionalized polymer of any of claims 9 to 10 wherein said functional group comprises a halogen atom.
14. The functionalized polymer of any of claims 9 to 10 wherein said functional group is a sulfone.
15. The functionalized polymer of any of claims 9 to 14 wherein said siloxane units are derived from a polysiloxane.
16. The functionalized polymer of claim 15 wherein said polysiloxane is hexamethylcyclotrisiloxane or octamethylcyclotetrasiloxane.
17. The functionalized polymer of any of claims 9 to 16 wherein said elastomer is a substantially random interpolymer comprising mer units derived from one or more vinyl aromatics and one or more polyenes.

18. The functionalized polymer of claim 17 wherein said elastomer is an interpolymers of styrene and butadiene.
19. The functionalized polymer of claim 18 wherein said interpolymers comprises from 20 to 35% by weight mer units derived from styrene.
20. The functionalized polymer of any of claims 18 to 19 wherein said interpolymers has a 1,2-microstructure of from 25 to 65%.